it is seen at once that the fort will not be hit when

$$v < \sqrt{ag(1 + \csc \phi)}.$$

295. Proposed by B. F. FINKEL, Drury College.

A homogeneous hollow cylinder whose inner radius is half its outer radius, rolls without slipping down a plane inclined at an angle α with the horizontal. Find its acceleration.

SOLUTION BY JOS. B. REYNOLDS, Lehigh University.

If in a section perpendicular to the axis of the cylinder, O is the center and A the point of contact with the plane, we shall have for the moment of inertia about O,

$$I_O = \frac{\pi}{2} e \left(r^4 - \frac{r^4}{2^4} \right),$$

and for the mass

$$m = \frac{W}{g} = \pi e \left(r^2 - \frac{r^2}{2^2} \right),$$

whence

$$I_O = \frac{5}{8} \frac{W}{g} r^2$$

and therefore

$$I_A = I_O + \frac{W}{g} r^2 = \frac{13}{8} \frac{W}{g} r^2.$$

Now taking moments about A, we have $Wr \sin \alpha = I_A \ddot{\theta}$ where $\ddot{\theta}$ is the angular acceleration, or

$$Wr \sin \alpha = \frac{13}{8} \frac{W}{g} r^2 \ddot{\theta},$$

whence $r\ddot{\theta} = \frac{8}{13} g \sin \alpha$, the linear acceleration of the center of the cylinder.

Also solved by H. S. UHLER.

QUESTIONS AND DISCUSSIONS.

EDITED BY U. G. MITCHELL, University of Kansas.

REPLIES.

24. The following facts are significant:

(1) The New England Association of Mathematics Teachers has appointed a committee "to investigate the current criticisms of high school mathematics."

(2) A committee of the Council of the American Mathematical Society has under consideration the question "whether any action is desirable on the part of the Society in the matter of the movement against mathematics in the schools."

(3) At the recent meeting in Cincinnati of the National Education Association an iconoclastic discussion on the topic: "Can algebra and geometry be reorganized so as to justify their retention for high school pupils not likely to enter technical schools?" aroused approbation and applause. An outline of the remarks by one of the speakers was printed in a previous issue.

In view of these facts what should be done by those who believe in the value of mathematics as a general high school study?

REPLY BY HARRISON E. WEBB, Central High School, Newark, N. J.

High-school teachers of mathematics should (1) do their utmost to restore the older ideal of high-school education as a serious business for the individual student; (2) relate their science as closely as possible to other studies which are pursued simultaneously; (3) preserve as closely as possible the essential continuity of the entire high-school mathematical course; (4) if necessary, as it may be, to accomplish these ends, eliminate excessive complications and omit less important topics; (5) give over entirely the notion that their subjects are absolutely logical, but make them positive so far as they go; and (6) believe in mathematics as possessing an incomparable moral value.

DISCUSSIONS.

RELATING TO INTERPOLATION IN TABLES OF TWO ARGUMENTS.

BY IRWIN ROMAN, Chicago, Ill.

Anyone who works with tables of two arguments has probably found interpolation inconvenient. The following method renders it possible with almost the same facility as interpolation in one argument. Let the function be given for four adjacent values, two in each argument. This may be represented schematically as follows. Let $A = f(x_1, y_1)$, $B = f(x_2, y_1)$, $C = f(x_1, y_2)$, $D = f(x_2, y_2)$ and let it be required to find $G = f(x_1 + \Delta x, y_1 + \Delta y)$ where

$$\frac{\Delta x}{x_2 - x_1} = e_x < 1 \qquad \text{and} \qquad \frac{\Delta y}{y_2 - y_1} = e_y < 1.$$

For convenience, let

$$x_1 \leqq x_1 + \Delta x \leqq x_2 \quad \text{and} \quad y_1 \leqq y_1 + \Delta y \leqq y_2.$$

Let

$$E = f(x_1, y_1 + \Delta y) \quad \text{and} \quad F = f(x_2, y_1 + \Delta y).$$

The usual way of finding G is to interpolate E from A and C, to interpolate F from B and D and finally, to interpolate G from E and F. This gives

$$E = A + e_y(C - A),$$

$$F = B + e_y(D - B),$$

$$G = E + e_x(F - E).$$

Carrying this step farther gives

$$\begin{aligned} G &= A + e_y(C - A) + e_x[B + e_y(D - B) - A - e_y(C - A)] \\ &= A + e_y(C - A) + e_x(B - A) + e_x e_y[(A + D) - (B + C)]. \end{aligned}$$

The last term is usually negligible, especially if $f(x, y)$ changes in the same sense for both x and y. This is simple to remember as it involves an interpolation horizontally and one vertically. It avoids the necessity of calculating E and F.